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ABSTRACT

Three studies were conducted with three groups of eighteen autistic children (3-11 years old) matched by age and IQ to developmental aphasic Ss to examine the nature of the cognitive deficit underlying autism. Two experiments were concerned with language comprehension using real and anomalous sentences, while the third investigation was an observational study of the play of autistic children. In experiment I, autistic Ss were found not to use a probable event strategy in sentence comprehension. In experiment II, autistic Ss demonstrated ability to extract and apply a linguistic rule (word order) but failed to apply a non-linguistic rule (probable event). In experiment III, the majority of the Ss spent most of their time engaging in simple undefined manual activity or repetitive manipulation with toys, with relatively few examples of relational or functional play. Data from all three studies were consistent with the hypothesis that autistic children have a specific cognitive deficit in understanding relational aspects of the environment, particularly for the probabilities involved in such relationships among people and objects. (CL)

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EARLY INFANTILE AUTISM: THE RELATIONSHIP BETWEEN A COGNITIVE DEFICIT AND LANGUAGE DYSFUNCTION[1]

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The recent literature on the syndrome of early infantile autism postulates a central cognitive deficit underlying the major symptoms of this disorder (e.g. Hermelin & O'Connor, 1970; Bryson, 1972; Rutter, Bartak, and Newman, 1971). There exists however, divided opinion on the precise nature of this deficit and its relationship to the language and social-emotional abnormalities which are the prominent clinical features of autism. The research presented in this paper addresses these issues; three experiments are described which were conducted to gain a clearer understanding of the language and related cognitive deficits in autism.

Subjects

Three subject populations participated in the first two language experiments. The experimental group, composed of eighteen autistic children (diagnosed according to the Rutter (1971) criteria) aged between 3;11 and 11;10, were obtained from four schools and one hospital in North America[2]. Care was taken to exclude children with a history of institutionalization and those medicated with behavior-controlling drugs. Two control groups were included. The first was a group of ten developmental aphasic children aged between 3;9 and 11;11, matched to the autistic group on age and non-verbal intelligence (measured with the Raven's Colored Progressive Matrices - RCPM). These children were obtained from the same agencies as the experimental subjects. The second control group included thirty normal children aged between 2;9 and 4;8, matched to the experimental group on the Peabody Picture Vocabulary Test (PPVT) and RCPM. Table 1 summarizes the major subject characteristics.

Experiment I

Very little is known about the language comprehension abilities of autistic children. In contrast, there are numerous studies on the development of sentence comprehension in normal children (e.g. Bever, 1970; Strohner & Nelson, 1974; Chapman, 1977) which have shown that young children depend on various strategies and contextual information to decode sentences which are beyond their limited syntactic competence. The two main strategies used are (i) Probable-event strategy - whereby children rely on information they know about the world to interpret sentences describing semantically biased events; and (ii) Word-order strategy - whereby a noun-verb-noun (NVN) sequence is interpreted as actor-action-object. The central issue addressed in this experiment was whether sutistic children would also use these strategies.

Each subject was presented with a set of twenty-four sentences which they were asked to act out with toys. Sentences were either unbiased, e.g. The boy pushes the girl; or semantically biased, e.g. The girl holds the baby (positive bias); The baby holds the girl (negative bias). Every sentence was presented in both active and passive voice. A pre-test ensured that the individual lexical items were understood by each subject. Responses were scored as correct, reversed (where agent and object were reversed) or other.

In order to test for the use of comprehension strategies, the data were analyzed on an individual subject basis. Consider first the word-order strategy for which the eight unbiased active and passive sentences are relevant. A child is considered to be using a word-order strategy if s/he acts out the active sentences correctly but reverses the passive ones. With one point awarded to each correct active and reversed passive, a child was credited with the use of a word-order strategy if s/he obtained a score of at least six out of a possible eight.

For the probable-event strategy the sixteen semantically biased sentences were analyzed. Evidence for the use of this strategy depends on correctly acting out the positively biased sentences and reversing the negatively biased sentences, regardless of sentence voice. Again one point was awarded to each correct positive sentence and reversed negative sentence and a child was credited with the use of a probable-event strategy if s/he obtained a score of at least twelve out of sixteen.

The number and percentage of subjects within each group using a word-order strategy and probable-event strategy are shown in Table 2.

It is clear from Table 2 that at least some of the normal and developmental aphasic children used both comprehension strategies, and that a number of the autistic children used a word-order strategy. However, only two out of eighteen autistic subjects made use of a probable-event strategy (chance level). The differences between the two disordered populations on the use of the two strategies was tested using a Chi-square, non-parametric statistic, and while there was no difference in their use of a word-order strategy ($X^2=0.058$), there was a significant difference between them for the probable-event strategy ($X^2=3.32$, $p< .05$).

Thus the main finding of this experiment is that in contrast to control groups, autistic children do not appear to use a probable-event strategy in sentence comprehension.

Experiment II

The second experiment investigated the same comprehension strategies as in Experiment I but using different stimuli. In an adaptation of a methodology pioneered by Sinclair and Bronckart (1972), the same subjects who participated in the first experiment[3] were presented with anomalous three-word items which they were again asked to act out with toys. The stimuli included four different word series composed of two nouns and a transitive verb (in the unmarked form) which were presented in each of the six possible word orders, yielding twenty-four items. One of the series was unbiased and three were semantically biased. This experiment was always carried out at least one week after Experiment I.

Subjects' responses were scored as N_1 - first noun as agent; N_2 - second noun as agent; or other. The data were analyzed for the use of comprehension strategies in a similar way as the responses were in Experiment I. The unbiased series was selected as relevant for a word-order strategy. In this case a child was credited with using the strategy consistently if s/he selected the first noun as agent (N_1) at least five

times out of six. The three semantically biased series were considered for the probable-event strategy. One point was awarded each time the more probable agent was selected, and a child was credited with the use of a probable-event strategy if s/he obtained a score of at least fifteen out of a possible eighteen. The number and percentage of subjects in each group using these two strategies are shown in Table 3.

In both the normal and developmental aphasic groups more subjects used a probable-event strategy than a word-order strategy with the anomalous items. This was not true for the autistic subjects. The difference between the two disordered populations in the use of a word-order strategy was not significant ($X^2=1.92$) but it was for the probable-event strategy, $X^2=3.01$, $p < .05$. Thus the results of this experiment confirm the findings of Experiment I, namely that autistic children are far less likely to use a probable-event strategy compared to control groups.

In order to understand the implications of these results one must first consider the difference between the two strategies. In applying a probable-event strategy all a child shows is that s/he can respond to the linguistic input on the basis of some understanding of the lexical items, particularly the nouns, and directly mapping his knowledge of the world, based on past experience, particularly knowledge about biases in the way objects or people relate to each other. Autistic children fail to use this kind of semantic/cognitive strategy. A word-order strategy, on the other hand, shows the application of a linguistic generalization that the child has abstracted from language input, namely that the order of words signals the basic relations in a sentence: agent-action-object.

Autistic children show no problem in extracting and applying a linguistic rule (word-order) but they do fail to apply a non-linguistic rule (probable-event). This problem may either indicate an unwillingness on the part of autistic children to apply their knowledge about biases in the world to a linguistic task, or perhaps the deficit is more fundamental and the absence of this probable-event strategy reflects their lack of awareness about such relational aspects of the environment. A third experiment was conducted to explore further the second hypothesis in a non-linguistic task.

Experiment III

The last experiment was an observational study of the play of autistic children, using the same toys employed in the other experiments. The main focus of this study was the question of whether the spontaneous toy play of the autistic subjects would also reveal an absence of relational or combinatorial activity, paticularly those combinations specified in the linguistic items used in the language experiments. Studies of the development of play in normal children (e.g. Fenson, Kagan, Kearsley and Zelazo, 1976) have shown that this kind of "relational play" precedes symbolic play, appearing towards the end of the first year.

Ten verbal autistic children (i.e. children with at least some productive language) participated in this experiment. The nine toys used in the language experiments were set out in front of the subjects who were allowed to play with them freely for ten minutes. The experimenter coded everything a child did, breaking the period into 15-second time blocks.

The subjects' play activities were classified into ten categories listed in Table 4. This table also shows the overall frequency and percentage of each activity, and the proportion of children making one or more responses of each type.

It is clear that the majority of the subjects were spending most of their time engaging in simple undefined manual activity or repetitive manipulation with the toys. There are relatively few examples of relational or functional play. Almost half the relational or functional acts recorded are of the simple type, in other words a meaningless or arbitrary combination of two objects. The only appropriate relational act was putting the hat on either of the dolls' heads. The only functional act was wheeling the car or truck on the table. There were no examples of symbolic play.

The results of this experiment are in general agreement with other studies on object play in autistic children (e.g. Tilton & Ottinger, 1964; Wing, Gould, Yeates and Brierley, 1977). These autistic children were comparable in their play to six- or eight-month-old infants, mouthing objects or simply handling them singly in a repetitive manner. There was almost no appropriate relating of two objects together or combinatorial play; very few examples of using a toy according to its designated function; and no examples of symbolic play which normally begins around eighteen months.

These findings lend support to the hypothesis presented earlier that autistic children do notunderstand or appreciate the relationships among objects and people in the environment. Thus in their play they do not relate objects meaningfully and in comprehension tasks they do not use a cognitive-semantically based probable-event strategy. Taken together the research presented in this paper points to a specific cognitive deficit underlying the linguistic and non-linguistic problems exhibited in autism - involving a deficit in understanding relational aspects of the environment, particularly for the probabilities involved in such relationships among people and objects (see also Menyuk, 1976). More plausibly perhaps, when one considers that many autistic children can get around in the world, use some language, and so on, it may mean that they can encode these kinds of biases inherent in relations, but that they do so in an extremely rigid way and cannot generalize these probabilities to new situations. While this postulated deficit is not intended to explain all facets of this complex syndrome, it does shed light on certain clinical features associated with autism and many disparate research findings.

References

Bever, T.G. (1970) The cogntive basis for linguistic structures. In J.R. Hayes (ed.) Cognition and the Development of Language. N.Y.: Wiley.

Bryson, C.Q. (1972) Short-term memory and cross-modal information processing in autistic children. Journal of Learning Disabilities, 5, 81-91.

Chapman, R.S. (1977) Comprehension strategies in children. In J.F. Kavanagh and W. Strange (eds.) Speech and Language in the Laboratory, School, and Clinic. Cambridge, Mass: MIT Press.

Fenson, L., Kagan, J., Kearsley, R.B., and Zelazo, P.R. (1976) The developmental progression of manipulative play in the first tow years. Child Development, 47, 232-236.

Hermelin, B. and O'Connor, N. (1970) Psychological Experiments with Autistic Children. Oxford: Pergamon Press.

Menyuk, P. (1976) Language of autistic children: What's wrong and why. Paper presented at the International Symposium on Autism, St. Gallen, Switzerland.

Rutter, M. (1971) The description and classification of infantile autism. In D.W. Churchill, G.D. Alpern, and M.K. DeMyer (eds.) Infantile Autism. Springfield, Illinois: C.C. Thomas.

Rutter, M., Bartak, L., and Newman, S. (1971) Autism - A central disorder of cognition and language? In M. Rutter (ed.) Infantile Autism: Concepts, Characteristics, and Treatment. London: Churchill Livingstone.

Sinclair, H. and Bronckart, J.P. (1972) S.V.O. A linguistic universal? A study in developmental psycholinguistics. Journal of Experimental Child Psychology, 14, 329-348.

Strohner, H. and Nelson, K.E. (1974) The young child's development of sentence comprehension: Influence of event probability, nonverval context, syntactic form and strategies. Child Development, 45, 567-576.

Tilton, J. and Ottinger, D. (1964) Comparison of the toy-play behavior of autistic, reatrded, and normal children. Psychological Reports, 15, 967-975.

Wing, L., Gould, J., Yeates,S.R. and Brierley, L.M. (1977) Symbolic play in autistic children. Journal of Child Psychology and Psychiatry, 18, 167-178.

Footnotes

1
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2
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3
Because of scheduling problems four normal subjects and one autistic subject did not take part in this experiment.

TABLE 1

The Subject Groups - Major Characteristics

	Group		
	A	D	N
Number	18	10	30
Mean Age	8;1	7;6	3;10
Mean Raw Score on PPVT	44.7	27.4	48.4
Mean Raw Score on RCPM	14.4	14.6	11.4

A - Autistic
D - Developmental Aphasic
N - Normal

TABLE 2

Subjects in each Group using Strategies in Experiment I

	Group		
	A	D	N
# Subjects using word-order strategy	5	4	12
% of Group	28%	40%	40%
# Subjects using probable-event strategy	2	5	13
% of Group	11%	50%	43%

TABLE 3

Subjects in each Group using Strategies in Experiment II

	Group		
	A	D	N
# Subjects using word-order strategy	5	0	4
% of Group	29%	0%	15%
# Subjects using probable-event strategy	2	5	8
% of Group	12%	50%	31%

TABLE 4

Total Frequency and Percentage of Each Response Category, and Proportion of Children Making at least One Response of each Type in Experiment III

Response Category	Total Frequency	Percentage	Proportion of Children
Self-stimulation	2	0.5	0.1
Oral	54	17.0	1.0
Repetitive	27	8.0	0.8
Manual	122	37.0	1.0
Visual Examination	13	4.0	0.7
Push/Pull	28	8.5	0.7
Moving Parts	34	10.0	0.8
Simple Relational	24	7.0	0.6
Appropriate Relational	16	5.0	0.7
Functional	10	3.0	0.5
TOTAL	330	100.0	